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## General Notes.

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### GEOLOGY AND PALEONTOLOGY.

**Currents of the North Atlantic.**—Prince Albert, of Monaco, has recently published a chart of the currents of the North Atlantic, entirely based upon the results of a series of experiments he has been conducting since 1885. In that year he launched 160 floats at intervals, along a line of 170 miles, in the direction of N. 14° W. from a point 110 miles northwest from Cowo, one of the Azores. The following year 510 floats were launched, nearly in the meridian 17° 40' west of Greenwich, between 42° 34' and 50° N. latitude. In 1887, 931 floats were launched along a line extending from the Azores to the Grand Banks, of Newfoundland. During the same year, a group of floats was launched between two other points in the North Atlantic, between the Azores and Newfoundland.

Of the floats thus launched, 227 were sent back to the experimenter with detailed information as to the place and date of finding. These several histories gave indications of the direction and speed of the currents which floated them. The internal edge of the great vortex performs a revolution with a very short radius round a point south-west of the Azores, and not very distant from them. The cycle described by objects drawn into the vortex is renewed indefinitely, except in the case where they escape by an offshoot into the Arctic regions.

The mean velocity for the region comprised between the Azores, Ireland, and Norway is 3.97 nautical miles in 24 hours; between the Azores, France, Portugal, and the Canaries it is 5.18 nautical miles in 24 hours. From the Canaries to the West Indies, the Bahamas, and even to Bermuda, it attains 10.11 nautical miles in 24 hours. In the eastern portion of the arc, which extends from Bermuda to the Azores, it falls again to 6.42 nautical miles in 24 hours. The mean velocity is 4.48 nautical miles in 24 hours. (Proceeds. Roy. Geog. Soc., Sept., 1892.)

**Fins of *Palæaspis Americana*.**—Mr. Claypole has recently published the description of certain objects which he believes to be the fins of *Palæaspis americana*. This fossil Mr. Claypole at first supposed to be a spine, but upon examination it was found to be mar-

gined with a flat fringe around the pointed end and the rounded conical parts were filled with matrix; this central spine-like portion is covered with a layer of the same tissue as that of which the shield is composed; the fringe around the conical central portion is distinctly striate in a direction approximately parallel to its axis. These points of resemblance to a Crossopterygian fin, together with the fact that one of the specimens was found so close to the side of the dorsal shield as to irresistibly suggest a connection, have decided Mr. Claypole to add the character of a fin to his amended definition of *Paleaspis americana*. (Quart. Journ. Geol. Sur. 1892.)

**New Reptiles from the Elgin Sandstone.**—We have already noticed the reptilian remains from the Elgin Sandstone, which are in the condition of hollow moulds, the bones themselves having entirely disappeared. Casts of these moulds have been made of gutta-percha, which upon examination prove to be models of eight distinct skeletons, of seven species of remarkable reptiles new to science. Professor E. T. Newton, to whom the casts were sent for identification, refers 5 of them to the genus *Gordonia*; *G. traquairi* (2), *G. huxleyana*, *G. duffiana* and *G. juddiana*. In *Gordonia*, as in *Dicynodon*, the maxilla is directed downward and forward to end in a small tusk. The former is distinguished from the latter by the presence of two post-temporal fossæ on each side of the occiput, by the small size of the maxillary tusk, and by the slight ossification of the vertebral centra. A second generic form, *Geikia elginensis* is nearly allied to *Lystrosaurus* Cope, but is distinguished by its shorter muzzle and the entire absence of teeth. The maxilla is produced into a tooth-like prominence, which occupies a similar position to the tusks of *Gordonia*. For the remaining species, Mr. Newton proposes the name *Elginia mirabilis*. The exterior of the skull is covered in by bony plates, the only apertures being the pair of nostrils, the orbits, and the pineal fossa. Horns and spines, varying from  $\frac{1}{4}$  inch to 3 inches in length are found upon nearly every bone of the exterior. This feature reminds one of the living lizards *Moloch* and *Phrynosoma*. With the exception of a smaller number of teeth, the dentition is a repetition on a large scale of *Iguana*. This peculiar skull seems to show affinities with both Stegocephali and Lacertilians, and is unlike any living or fossil form; its nearest, though distant ally apparently being the *Pariasaurus* from the Karoo beds of South Africa. (Nature, Dec., 1892.)

**Fossil Reptiles from the Parana.**—In the Boletín of the Academia Nacional de Ciencias of Cordova (Argentina), Mr. Juan B.

Ambrosetti describes three new species of fossil reptiles from the Oligocene of the Parana. He also describes more fully three other species already named by Bravard, Burmeister, and Scalabrini. The entire number are referred to five genera, of which four are reported to be new. The descriptions of species are quite full, but the new genera are not described at all, so that they have, so far, no scientific standing. One of them is said to be near to *Tupinambis* ("Podinema"), and the others are crocodiles. Three of them are regarded as near to the gavials, and are an interesting addition to the South American fauna, if this statement is confirmed. But the author is not yet fully competent for the task he has undertaken. He writes of the "Ameividae," meaning Teiidæ, and imagines that *Rhamphostoma* was proposed by Burmeister in the Annals of the Museum of Buenos Ayres! His knowledge of classic composition is indicated by his construction of the abortion *Oxysdonsaurus*, of which an American grammar school boy would not have been guilty. He should have written *Oxyodontosaurus*, a very awkward name at best. As the genus is not defined, however, nobody is under obligation to adopt it.—E. D. C.

### On the Systematic Position of the genus *Protogonodon*.

—The collection of fossil mammalia in the American Museum from the Puerco formation contains among the numerous specimens a few upper teeth, and a number of lower jaws belonging to the genus *Protogonodon*, Scott<sup>1</sup> (—*Mioclenus* Cope, in part). I consider the material referable to the genus *Protogonodon* as the most important in this collection, as it enables me to probably settle the question as to its phylogenetic position in the system.

Professor Cope's type of *Protogonodon* is a lower jaw with teeth. In his description<sup>2</sup> of this specimen, he considered it as probably closely related to the *Condylarthra*, but as he was not familiar with the upper molars, he placed it in the rather indefinite genus *Mioclenus*. Later Professor Scott<sup>3</sup> in his valuable paper on the *Creodonta* removed the *M. pentacus* from *Mioclenus*, and established the genus *Protogonodon* for its reception. Professor Scott places this genus among the *Condylarthra*, and probably in the family *Phenacodontidae*.

The series of upper molars in the collection which I refer to *Protogonodon* were not found associated with lower teeth, so that their reference to this genus is not absolutely certain. However, as the lower

<sup>1</sup>Proc. Philad. Academy, 1892, p. 322.

<sup>2</sup>Synopsis of the Vertebrate fauna of the Puerco series, 1888.

<sup>3</sup>Op. cit.

true molars of *Protogonodon* are of the sextubercular type, I believe they should be associated with a superior molar which is tritubercular. These upper molars consist of three principal cones with well developed intermediate tubercles; the external cones differ considerably in form from those of the Creodonts (*Sarcotyrantes*), but the general form of the upper true molars in *Protogonodon* closely resembles that of the Creodonts.

Another character of the teeth of *Protogonodon* which differentiates it from the Perissodactyle line is the character of the inferior premolars. The last tooth of this series is much simpler in structure than in *Protogonia*, and closely resembles that of *Pantolestes*. It consists of a simple cone with a slightly enlarged heel. In *Protogonia puercensis* on the other hand, a well marked deutercone is present, and this tooth is nearly as complex as it is in *Phenacodus*.

I believe from these characters of the teeth, and also from the fact that the lower jaw is elongated and slender, as in the genus *Pantolestes*, that *Protogonodon* should be placed near the latter genus, and may stand in ancestral relation to it.

Unfortunately the foot structure of *Protogonodon* is totally unknown, so until that is discovered we cannot decide its affinity with certainty.

It is of great interest to note, if my supposition be correct, that in the genus *Protogonodon* we are dealing with an ancestral Artiodactyle, and that already as far down as the lowermost Eocene (Puerco) the main types of the Ungulata were differentiated. It will not then be necessary to resort as Schlosser has done to derive the Artiodactyla from any of the known Periptychidæ, but that the Perissodactyla were represented by *Protogonia*,<sup>4</sup> the Artiodactyla by at least *Protogonodon* and perhaps other genera, as suggested by Professor Scott. Lastly as Professor Cope has shown the *Amblypoda* were already evolved and represented by the genus *Pantolambda*.

Whether or not these Ungulate stems were in all cases distinct from the Condylarthra, remains for future research to prove; but at least one of them, the *Amblypoda*, was differentiated. In the case of *Protogonodon* the structure of its teeth shows that it was fairly well on the Artiodactyle line, but the discovery of its foot structure will demonstrate whether or not it had passed the Condylarthrous stage.

I believe that among the Puerco Condylarthra that *Protogonia* was a persistent type, and nearly all of the Periptychidæ with the possible

<sup>4</sup>Professor Cope informs me by letter that the name *Protogonia* is preoccupied, and he proposes as a substitute the name *Euprotogonia*.

exception of *Mioclenus turgidus* died out and left no descendants.—  
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**The Brown Coal and Lignite of Texas.**<sup>5</sup>—Mr. E. T. Dumble's comprehensive report on the fossil fuel supply of Texas has been issued as a separate publication by the Geological Survey of that State. In the course of his investigations, Mr. Dumble found it necessary to visit the mines and factories of Austria and Germany, where by personal observation he ascertained the character, use, and value of lignites, together with the best methods of utilizing this fossil wealth. His report is complete, both from a geological and an economic standpoint. Geologically, he describes the origin, formation, physical and chemical character, and the occurrence of the brown coal. Incidentally a classification of the Texas brown coals is given. As an economist, Mr. Dumble suggests the particular uses to which the varieties of brown coal may be put, discusses the valuable products that may be obtained from it, and gives in detail the most approved methods of making it into artificial fuel by bridgetting. In a word, Mr. Dumble has demonstrated that in her brown coals and lignite, Texas has an abundant and cheap fuel supply.

The text is illustrated with a number of cuts of machinery, and an excellent map.

**Extinct Fauna of Mauritius.**—At the meeting of the Zoological Society, of London, Nov. 1, 1892, a communication was read from Sir Edward Newton and Dr. Gadow, describing a collection of bones of the dodo and other extinct birds of Mauritius, recovered from the Mare aux Songes in that island by the exertions of Mr. Theodore Sauzier. The collection contained examples of the atlas, metacarpals, prepubic vertebræ and complete pubic bones of the dodo, which have heretofore been wanting, as well as additional bones of *Lophopsittacus*, *Aphanapteryx* and other forms previously known to have inhabited that island. Besides these there were bones of other birds, the existence of which was not before suspected, and these were described as belonging to the genera *Strix*, *Astur*, *Butorides*, *Plotus*, *Sarcidiornis*, and *Anas*.

<sup>5</sup>Report of the Brown Coal and Lignite of Texas. Character, Formation, Occurrence and Fuel Uses. By E. T. Dumble, F. G. S. A., State Geologist.